

AN ASSESSMENT OF DIVERSITY STATUS OF ZOOPLANKTON

IN JAL GHAR BHIWANI, (HARYANA) INDIA

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ABSTRACT

Abundance, community composition and density of zooplankton were analyzed in the water body of Jal Ghar Bhiwani Haryana (India) from January, 2016 to June, 2016. A total of 13 species of zooplanktons (7 species of Rotifers, 3 species of Brachiopods, 2 species of Copepods and 1 species of Ostrachopod) belonging to 13 genera, 9 families, 5 orders and 4 classes were recorded during the study period. Rotifers were the dominant group among zooplankton community, with 7 species constituting 54 % of the total zooplankton population. High Shannon diversity index (0.87) was recorded during June month indicating high diversity and high Simpson's index (2.3) was also recorded in June month indicating high species dominance.

KEYWORDS: Zooplankton, Community Structure, Population Density, Jal Ghar

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INTRODUCTION

Ecologically zooplanktons are considered to be the most important biotic components and function at many levels such as food chains, food webs, energy flow and cycling of matter (Colloquium, 2001, Park and Shin, 2007; Tyor *et al.*, 2013 and Chopra *et al.*, 2014).

The productivity and composition of zooplankton are considered as indicators of environmental quality and water contamination levels in lakes, reservoir, river, estuaries etc., therefore, these are very important factor for pisciculture (Sharma, 1983; Berzins and Pejler, 1987; Saksena, 1987; Mikschi, 1989; Akbulut, 2004; Bhora and Kumar, 2004). To understanding the life processes in any lentic or lotic water body, there is adequate knowledge of zooplankton communities and their population dynamics is required. In Haryana, (India), considerable investigations have been made by various scientist in aquatic ecosystem considering specially zooplanktons such as Sharma, 1983; Saksena, 1987; Jha and Barat, 2003; Kulshrestha and Sharma, 2006; Jayabhaye and Madlapur, 2006 and Kumar *et al.*, 2010; Chopra *et al.*, 2013; Tyor *et al.*, 2013; Chopra *et al.*, 2014). However, little information is available on limnological studies of district Bhiwani, hence, an attempt has been made to know the zooplankton population along with composition and abundance in above mentioned study site.

MATERIALS AND METHODS

Study Area

District Bhiwani (latitude 28°46'N and longitude 76°7'E) is located in, Haryana (India) (Figure 1). The district covering total area of 5,140 square kilometres includes 442 villages with a population of 1,629,109.

Bhiwani being dry district of Haryana implemented jal ghar for water conservation and treatment. The jal ghar of Bhiwani contains four large water reservoir and harbor a variety of flora and fauna. These sites are unattended in research point of view or very scanty literature is available on the fauna of this site. So in present study jal ghar Bhiwani is selected as study site to know the aquatic fauna.

Fortnightly sampling of the zooplankton was carried out from January 2016 to June, 2016 at selected sampling sites of jal ghar. The samples were collected in triplicate by filtering 50 L of water through plankton net and the concentrated samples were preserved in 4% formalin solution. The samples were analyzed quantitatively and qualitatively in the laboratory. Species diversity was calculated by Shannon-weaver diversity index (Shannon-weaver, 1949) and species dominance was calculated by Simpson diversity index (Simpson, 1949). Identification of zooplankton up to generic level was carried out following Needham and Needham (1962); Tonapi, (1980); Ahmad, (1996).

RESULTS AND DISCUSSIONS

During the period of investigation, a total number of 13 species (7 species of Rotifers, 3 species of Branchiopods, 2 species of Copepods and 1 species of Ostracopods) of zooplanktons belonging to 13 genera, 9 families, 5 orders and 4 classes were recorded in the study site.

Rotifers were the dominant group among zooplankton community with 7 species and 9 genera, namely, *Brachionus*; *Keratella*; *Monostyla*; *Ceratiu*; *Trichocera* and *Lacena* constituting 54 % of the total zooplankton population (Table 1 and Figure 1a). Earlier also, high populations of rotifers particularly, *Brachionous* were reported for tropical environment (Dadhick & Saxsena, 1999; Mulani *et al.*, 2009; Chopra *et al.*, 2014). Genus *Brachionous* of order Monogononta is represented by 46 species in India (Sharma, 1983; Kumar, 2001 and Chopra *et al.*, 2014). In the present study also, species of *Brachionous* were recorded in all the months among zooplanktons population and maximum number of zooplankton species encountered in June month (Table-1). According to Tyor *et al.*, (2013) increase in temperature and high evaporation during summer enhances the rate of decomposition resulting in increase in population diversity and density of zooplanktons. Further, higher zooplanktons population during summer might be due to hypertrophical conditions of the water body at high temperature and low level of water (Jayabhaye and Madlapur, 2006).

Branchiopods were represented by 3 genera and constituted 23 % of the total identified zooplankton (Figure 1a) *Moina*, *Daphnia*, and *Chydorus* were dominant among Branchiopods. All the three reported species of Branchiopods were encountered during May and June and minimum number of species encountered during winter months i.e., January and February (Table 1). Some earlier reports confirm that low temperature, low turbidity and high alkalinity during winter influence the population of Branchiopods (Joseph and Yamakanamard, 2011, Tyor *et al.*, 2013).

The Copepods were considered as dominant planktonic group of both fresh and marine habitat (Dadhick and Sexena, 1999; Park and Shin, 2007). During present study, Copepods constituted 15 % of the total identified zooplankton of which *Cyclopes* and *Nauplis* were recorded in all the months. *Nauplius* larvae were dominated in the June. According to Purandara *et al.* (2003) during monsoon months, high turbidity, high alkalinity and high pH affect the copepods population and they flourish at their high pace.

Mulani *et al.*, 2009 reported ostracopods in wide variety of aquatic habitats and were considered very common in most inland water. During the present investigation only one member, i.e., *Cypris sp.* of class Ostracopod was encountered in February and June month (Table 1).

Zooplankton diversity index ranged from 0.47 to 0.87, being maximum in June and minimum in April as calculated by Shannon diversity index (Figure 1b). during the present investigation high Shannon diversity index during June month indicating high species diversity which coincides with high dominance of species, as calculated by Simpson's index (Table 1). Earlier, Tyor *et al.*, (2013) also reported high density, diversity and dominance during monsoon months

CONCLUSIONS

Zooplankton are very important in monitoring pollution level in water body, it is therefore, suggested that jal ghar, Bhiwani requires further research to preserve the ecosystem for effective management of water and local flora and fauna.

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APPENDICES

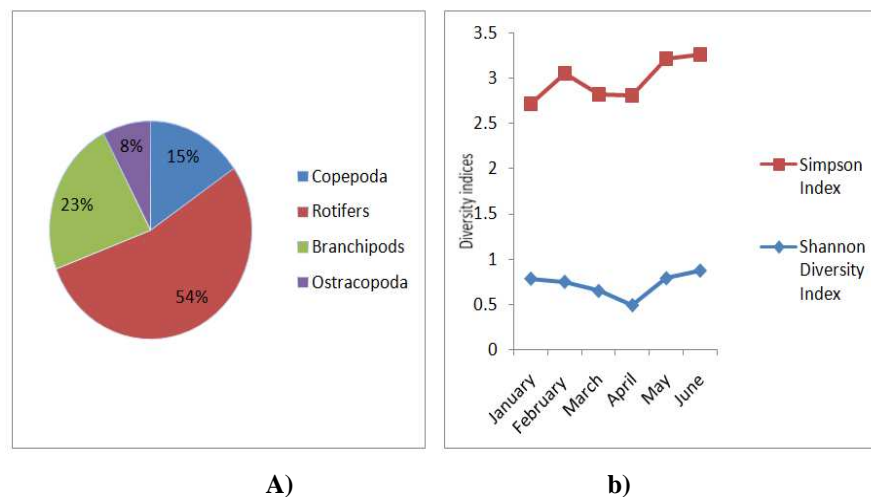


Figure 1: Showing (A) Per Cent Composition of Zooplanktons and (B) Graph Showing Monthly Variation in Species Indices

Table 1: Systemic Position and Seasonal Variation of Zooplankton of Jal Ghar Bhiwani

Sr. No	Class	Order	Family	Species	January	February	March	April	May	June
1	Copepoda	Cyclopoida	Cyclopidae	<i>Cylopes sp.</i>	+	+	+	+	—	—
2				<i>Nauplius larvae</i>	+	+	+	+	+	+
3	Rotifers	Monogononta	Brachionidae	<i>Brachionus sp.</i>	+	+	+	+	+	+
4				<i>Keratella sp.</i>	+	+	—	—	+	+
5				<i>Monostyla sp.</i>	—	+	+	+	+	—
6			Trichocercidae	<i>Ceratium sp.</i>	—	+	+	+	+	—
7				<i>Trichocera sp.</i>	+	+	+	—	—	+
8				<i>Lacena sp.</i>	+	—	+	—	—	+
9	Branchipods	Flosculariaceae	Testudinellidae	<i>Filinia sp.</i>	+	—	+	+	—	+
10				<i>Daphnia sp.</i>	—	—	+	+	+	+
11		Cladocera	Chydoridae	<i>Chydorus sp.</i>	—	+	—	+	+	+
12				<i>Moina sp.</i>	+	—	—	+	+	+
13	Ostracopoda	Podocopidae	Cyprididae	<i>Cypris sp.</i>	—	+	—	—	—	+